Service Manual

HUMALYZER *Junior*

Ver. 1.02

Cat.-No.: 18076

CE

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1.0 FOREWORD

The HUMALYZER Junior analyzer for clinical-chemistry is an interferential filter photometer, completely managed by microprocessors, that can take photometric measures and process them according to programs with parameters that can be entered by the operator. Particularly, the following determinations can be carried out:

ABSORBANCE

***END-POINT* (Concentration)**

KINETICS

FIXED-TIME

The selection of the interferential filter is automatic, with powered handling managed by a microprocessor. This characteristic makes reading easier and eliminates filter selection errors that may occur in the instruments with manual selection. The instrument optics is very sophisticated: there is a tungsten lamp (2 W) and the light beam is centered by a quartz lens allowing a high measuring accuracy even when reduced volume cuvettes are used. 30 programs can be stored. All the test parameter values can be stored permanently in the instrument.

A 2-position temperature switch is also installed in the instrument for square and round cuvettes. The temperature of the thermostatic unit is equal to the cuvette one, i.e. 37°C. The instrument is programmed by means of a keyboard for the entry of the required parameters by a 32-character alphanumeric display. This display visualizes also the instrument states and error or malfunction signaling. The test results are directly displayed in the pre-selected measuring units when programmed.

The use of the instrument is assisted by an advanced software that guides and controls the operations made by the user. The instrument is equipped with an acoustic signaler to furthermore help the user. A sound with a tone different from the usual one warns when the wrong key is pushed. To make an analysis it is necessary to enter all its parameters correctly, including the K and standard values.

The instrument is provided with a serial RS-232 standard output.

2.0 TECHNICAL CHARACTERISTICS

Photometric systems

Light source:	2 W long-life Halogen incandescent lamp
Spectral field:	340 to 700 nm.
Filter change:	automatic
Filters:	340,405,505,546,578nm.; 8 nm. pass-band
Detector:	solid state device

Thermostating

Heating element:	semiconductor
Temperature:	37 °C
Temperature accuracy:	±0.2 °C
Stabilization period:	10-20 min.
Thermostatic unit:	2 positions for square or cylindrical cuvettes

Measuring system:

Reset:	automatic
Measuring range:	0 to +2,000 OD
Photometric linearity:	±2% from 0 to 1,700 OD 1%
Photometric accuracy:	±2% from 0 to 1,700 OD
Precision:	±2 digit
Drift:	lower than 0.005 O.D. per hour
Reagent volume:	1 mL (minimum)
Measure method:	End-point, Kinetics, Fixed-time, Differential

Data display and programming:

Keyboard:	with 4 function keys
Display:	back-illuminated liquid crystals alpha-numeric, with 32 characters
Thermal printer: (**optional**)	20 columns
Serial output	RS-232 standard
Power supply:	220 V, 50 Hz; 117 V, 60 Hz; 40 VA
Size:	cm. 27.5x21x9
Weight:	3.8 kg.

3.0. KEYBOARD

The instrument is equipped with a keyboard of 4 keys. For the quality control and maintenance of the instrument the 4 keys have particular functions. In the following pages of this manual the 4 buttons will be identified as PG, ENTER, UP, DOWN (from top to bottom in decreasing order).

4.0 TEST PROGRAMS

To verify the correct functioning of all mechanical and electrical parts, the instrument is equipped with a certain number of test programs.

These 12 test programs are divided in 3 groups of 4 each (TEST 0, TEST 4,TEST 8)

The 4 programs of TEST 0 are put in action switching on the instrument by keeping pressed the ENTER key, the programs of TEST 4 by pressing the UP key, the programs of TEST 8 by pressing the DOWN key.

When any of the test programs is activated (TEST 0, TEST 4, TEST 8), in the first row of the display the following information will appear:

HUMANXXX N H.HH

HUMANXXX	is the software version of the program
H.HH	is the hardware version of the program

The second row indicated whether the incubator is on temperature or not:

NO TEMP	incubator not on temperature
TEMP OK	incubator on temperature

4.1 TEST 0

The 4 keys have the following functions:

PG	Turns on the filter motor and fills the display with F. To switch off the instrument, any key can be pressed.
ENTER	Turns off the display pixels.
UP	Transfers the entire set of ASCII characters to the serial.
DOWN	Turns on all display pixels.

4.2 TEST 4

PG — Starts the reading procedure in absorbance with the lamp remaining switched on continuously. Pressing the PG key, the lamp switches on. Wait a few seconds (5-10 sec.) in order that the lamp temperature becomes stable. Insert a blank cuvette. Press any key. On the display 3 numbers will appear: 2 on first row and 1 on the second row. The number on the right side of the first row is the cuvette absorbance present in the reading chamber. The number on the left side of the first row is used during preamplifier board adjustment. Press any key to exit from this function.

ENTER — Select filter 1 (340 nm)

UP — Select filter 2 (405 nm)

DOWN — Select filter 3 (505 nm)

4.3 TEST 8

PG — Starts the reading procedure in absorbance with the lamp remaining switched on continuously. Pressing the PG key, the lamp switches on. Wait a few seconds (5-10 sec.) in order that the lamp temperature becomes stable. Insert a blank cuvette. Press any key. On the display 3 numbers will appear: 2 on first row and 1 on the second row. The number on the right side of the first row is the cuvette absorbance present in the reading chamber. The number on the left side of the first row is used during preamplifier board adjustment. Press any key to exit from this function.

ENTER — Select filter 4 (546 nm)

UP — Select filter 5 (630 nm)

DOWN — Select filter 6 (optional)

5.0 INSTRUMENT ADJUSTMENTS

On the instruments the following 3 types of adjustments are foreseen:

5.1 ADJUSTMENT OF LAMP ALIMENTATION VOLTAGE (NEW LAMP !)

Select TEST 0. Connect a multimeter between pin 1 and 2 of J3 (Fig.5-Fig.8). Press the PG key. At this point the instrument lamp will be switched on. Move the trimmer RV1 (Fig.5-Fig.8) until the voltage measuring will be 5,7 V. (Old lamp = 3.7 V)

Instruments below Serial number 6050 need to be modified for use of the new lamp. Assemble in parallel to R15 a resistance of 120 OHM (1%)

Performe the Preamplifier Adjustment as described at next page.

5.2 ADJUSTMENT OF DISPLAY BRIGHTNESS

Move trimmer R7 (Fig.4 and Fig.8) until the best pixel contrast on the display is obtained.

5.3 ADJUSTMENT OF INCUBATOR TEMPERATURE

Disconnect the connector J8 of the incubator from the CPU Board (Fig.7-Fig.8). Insert into connector J8 a new connector with resistance of 3014 Ohm between pin 1 and 2. Select the TEST 0 program. Press the PG key (the display will be filled with F characters). Wait a few seconds (2-4 sec.). Press the PG key. In the second row of the display one of the following messages will appear: NO TEMP or TEMP OK. Move the trimmer RV4 clockwise until on the display the message TEMP OK will appear. Move slowly the trimmer anticlockwise until the message NO TEMP will appear.

6.0 PREAMPLIFIER ADJUSTMENT

1. Choose the TEST 4 program and select filter 1 (340 nm) with the ENTER key.

2. Switch on the lamp with the PG key and press it again to let appear some values on the display. Adjust the trimmer R4 (Fig.2, Fig.3) on the preamplifier board to obtain the value on the upper left side between 2000 - 7500. Switch off the lamp pressing the PG key.

3. Verify the value of the number on the upper left side on all filters:

   Test program 4 - filter 2 (UP key)
   Test program 4 - filter 3 (DOWN key)
   Test program 8 - filter 4 (ENTER key)
   Test program 8 - filter 5 (UP key)

   This value must be between 2000 and 7500 on all filters. If necessary, adjust the trimmer R4 (Fig.2, Fig.3) on the preamplifier board to obtain that all filters fall within this interval.

4. Adjust the OFFSET voltage on Pin 6 of U6 (Fig.6, Fig.8) on the CPU board with the trimmer R1 (Fig. 1, Fig.8) of the preamplifier board to - 10mV. Protect the optical sensor from any light by inserting a black cuvette (one of your fingers will do the same) into the reading position.

5. Choose the TEST 4 program and select filter 1 (340 nm). Insert the blank solution and press the PG key to switch on the lamp. Wait a few seconds (5-10 sec.). Press PG again, on the upper right side the absorbance value will appear. Insert a solution of value within 1800 and adjust the known absorbance value 10 digits higher than the nominal value at approx. 1800 with the trimmer R1 (Fig. 2, Fig. 3) on the preamplifier board.

7.0 LAMP REPLACEMENT

1. Loosen the fixing screw placed over the incubator group.

2. Unsolder the lamp wiring.

3. Solder the wiring of the new lamp.

4. Insert the lamp in the apposite chamber and lock again the fixing screw.

5. Adjust again the preamplifier board.

8.0 SERIAL OUTPUT

The instrument is equipped with a standard RS232 serial output for the transmission of the test results.

The exit connector is standard type at 9 poles and is placed on the rear of the instrument. The connector pins have the following purposes:
pin 2: input
pin 3: output
pin 5: reference signal

The connector at 9 poles is the same type used in the serials of IBM compatible Personal Computers.

The serial protocol is the following:

Speed:	9600 baud rate
Parity bit:	No
Number of transmitted bits:	8
Number of stop bits:	1

On the serial the instrument transmits the results in ASCII standard format. Each transmitted row is terminated by 2 characters: carriage return (CR - 0DH) and new line (LF - 0AH).

The transmitted results are all in one row which has the following format:
NNNN AAAA UUUUU RRRRR *
NNNN Is the progressive number of analysis which is increased automatically every time an analysis is performed. At ignition of instrument this parameter is initialized at value 0001.
AAAA Method mark
UUUUU Measuring unit
RRRRR Test result.
* A flag is present in methods for kinetic or fixed time if an analysis is performed with the instrument not on temperature.
For the methods of kinetic type, the test result is preceded by 4 rows containing the 4 delta absorbances; these 4 rows have the following format:

D. Abs..... AAAA

AAAA Absorbance variation between two readings.

9.0 APPENDIX

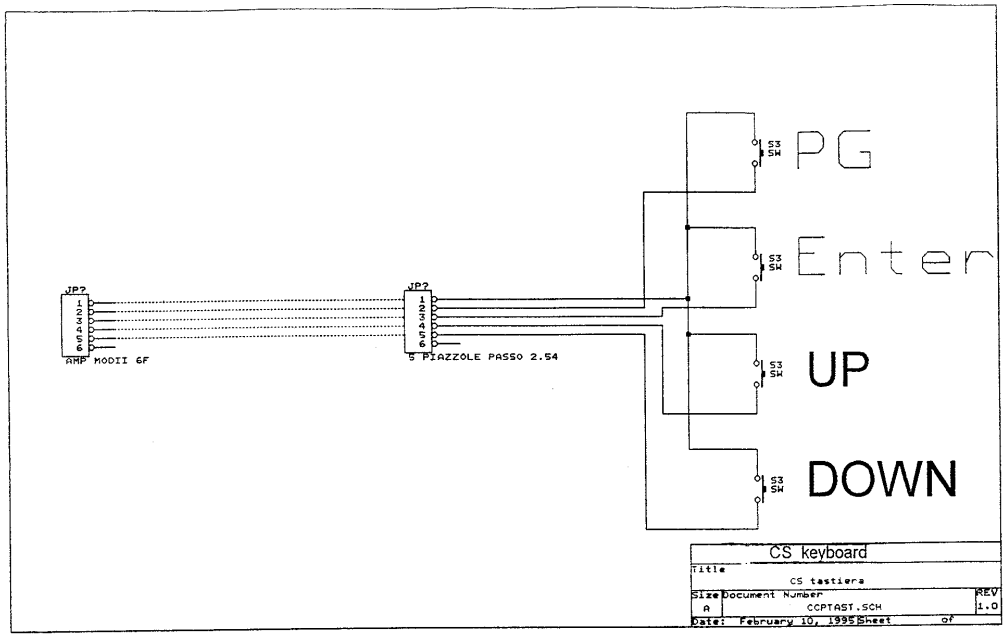


FIG. 1

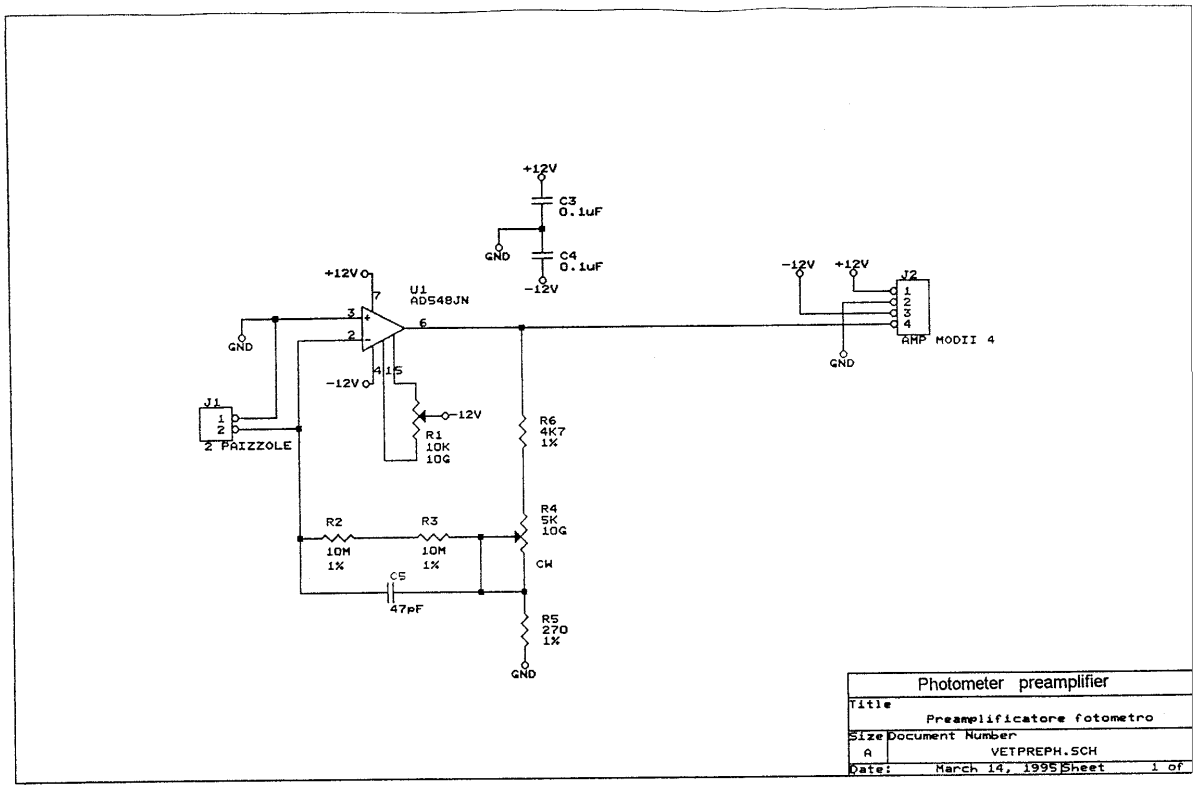
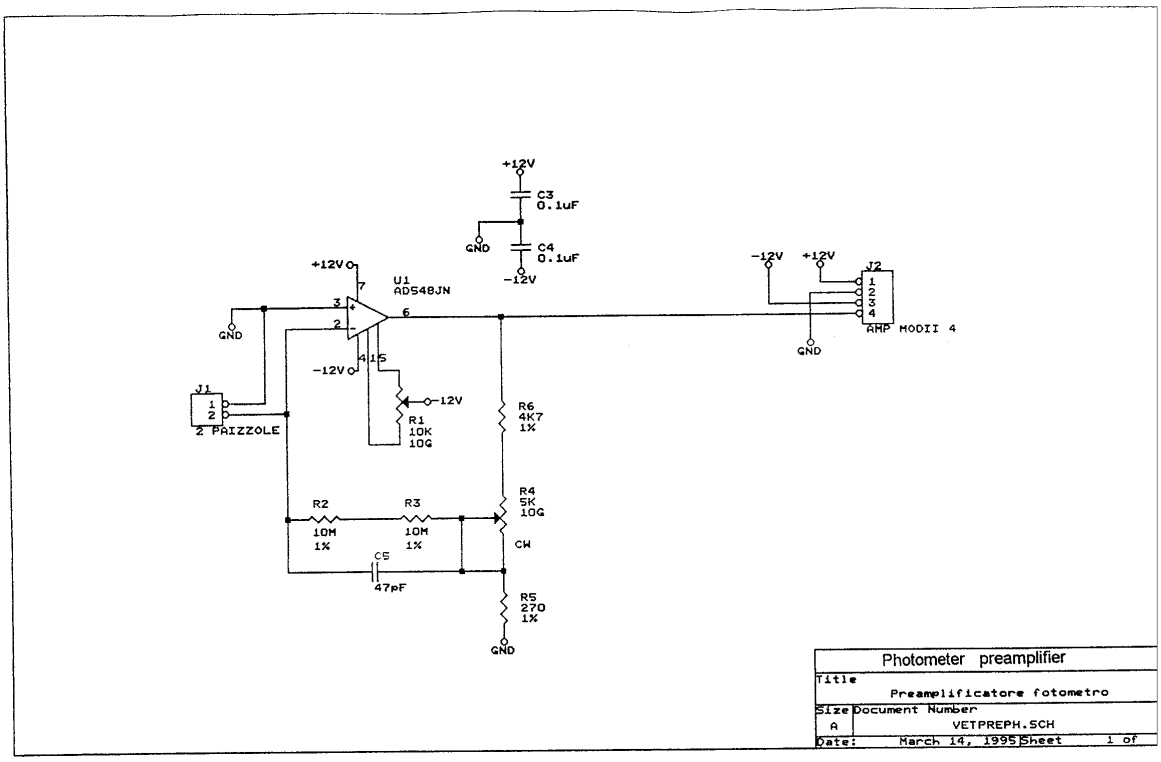


FIG. 2


+12V
C3
0.1uF
GND
C4
0.1uF
-12V
+12V
U1
ADS48JN
7
3
2
6
4
5
GND
-12V
-12V
+12V
J2
1
2
3
4
AMP MODII 4
GND
J1
1
2
2 PAIZZOLE
R1
10K
10G
-12V
R6
4K7
1%
R2
10M
1%
R3
10M
1%
R4
5K
10G
CW
C5
47pF
R5
270
1%
GND
Photometer preamplifier
Title
Preamplificatore fotometro
Size
A
Document Number
VETPREPH.SCH
Date:
March 14, 1995
Sheet
1 of

Item	Quantity	Reference	Part
1	1	BZ1	BUZZER
2	2	C1,C2	22pF
3	1	C3	10uF
4	3	C4,C23,C28	100uF
5	5	C5,C6,C7,C11,C12	1uF
6	6	C8,C9,C10,C13,C24,C25	0.1uF
7	2	C14,C15	220uF 16V
8	1	C16	220uF 25V
9	1	C17	4700uF 25V
10	3	C18,C19,C21	100uF 16V
11	1	C20	4700uF 16V
12	1	C22	1000uF 16V
13	1	C27	0.47uF Pol
14	8	D1,D3,D4,D5,D7,D8,D9,D10	1N4148
15	1	D2	1N4004
16	1	DZ3	10V
17	1	J1	AMP MODII 8
18	1	J2	AMP MODII 6
19	1	J3	PIAZZOLE BUMP CONTACTS
20	1	J4	AMP MODUII 15
21	1	J5	AMP MODUII 2
22	2	J6,J8	AMP MODUII 6
23	1	J9	AMP MODUII 4
24	1	LP1	3.5V 0.5A
25	1	NTC1	5K
26	1	PD1	FBU4
27	1	PD2	50V 1A

Item	Quantity	Reference	Part
28	5	Q1,Q4,Q6,Q7,Q9	BC547
29	2	Q3,Q5	BC307
30	1	Q8	TIP127
31	1	R1	10M
32	14	R2,R3,R4,R5,R21,R22,R23, R39,R40,R41,R42,R43,R50, R52	10K
33	1	R6	330
34	1	R7	2K2 10G.
35	4	R11,R12,R13,R56	100K
36	1	R14	270 1%
37	1	R15	120 1%
38	1	R16	1
39	2	R19,R20	0
40	1	R24	100K 1%
41	3	R25,R44,R46	470
42	1	R26	10K 1%
43	1	R35	22K
44	3	R36,R49,R51	4K7 1%
45	1	R37	100 1%
46	1	R38	1K5
47	1	R45	1K
48	1	R48	2K7
49	1	R53	1M
50	2	R54,R57	4K7
51	1	R55	1 5W
52	1	RV1	4K7 10G.
53	1	RV4	500 10G.

CCP.SCH
Bill Of Materials

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Item	Quantity	Reference	Part
54	1	U1	MC68HC705C8
55	1	U2	IL420
56	2	U3,U5	93C66
57	1	U4	MAX232
58	1	U6	27M9
59	1	U7	LM7812
60	1	U8	LM7912
61	1	U9	LM7805
62	1	U10	LM317
63	1	X1	4MHz

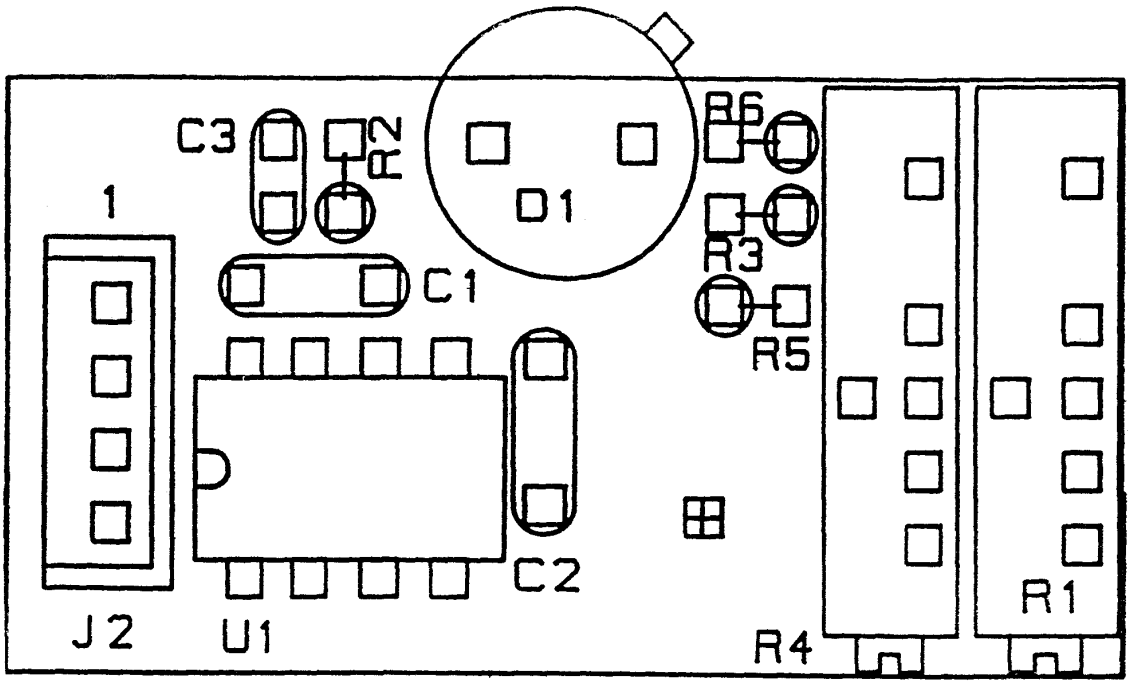
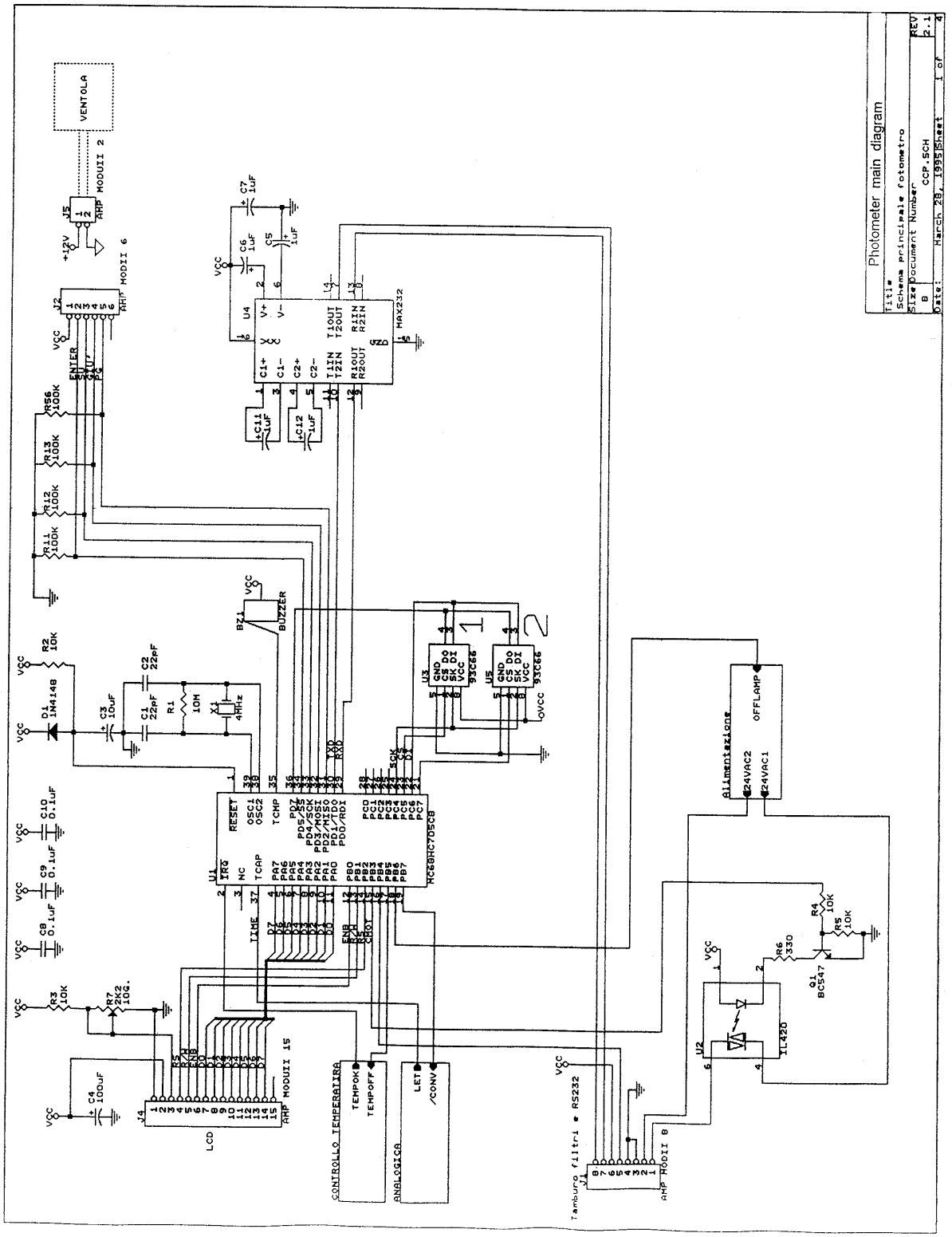


FIG. 3

Item	Quantity	Reference	Part
1	2	C3,C4	0.1uF
2	1	C5	47pF
3	1	J1	2 PAIZZOLE BUMP CONTACTS
4	1	J2	AMP MODII 4
5	1	R1	10K 10G
6	2	R2,R3	10M 1%
7	1	R4	5K 10G
8	1	R5	270 1%
9	1	R6	4K7 1%
10	1	U1	AD548JN


Photometer main diagram
Title
Schema principale fotometro
Size
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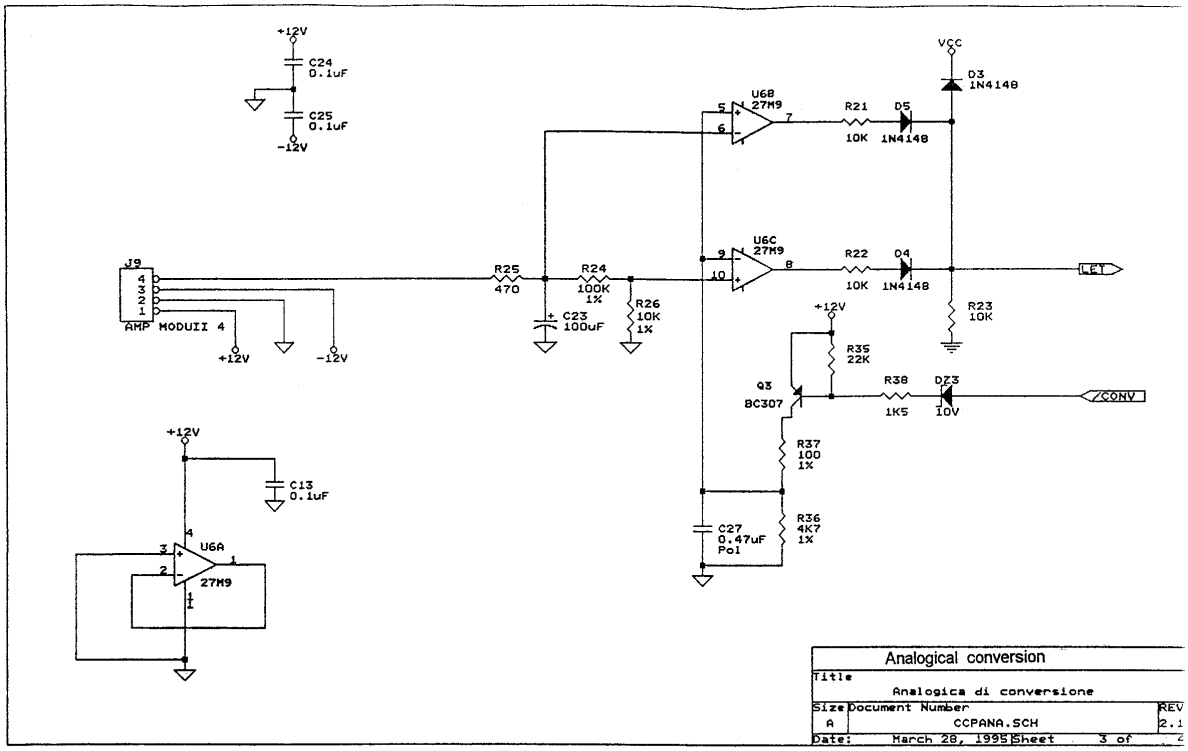
Document Number
CCP.SCH
REV
2.1
Date:
March 28, 1995
Sheet
1 of 4
VENTOLA
MODULI 2
MODULI 6
MODULI 15
MODULI 8
LCD
BUZZER
MAX232
93C66
MC68HC705C8
OFFLAMP
IL420
BC547
Alimentazione
24VAC2
24VAC1
CONTROLLO TEMPERATURA
ANALOGICA
TEMPOK
TEMPOFF
LET
/CONV
Tamburo filtri e RS232
VCC
GND

FIG. 4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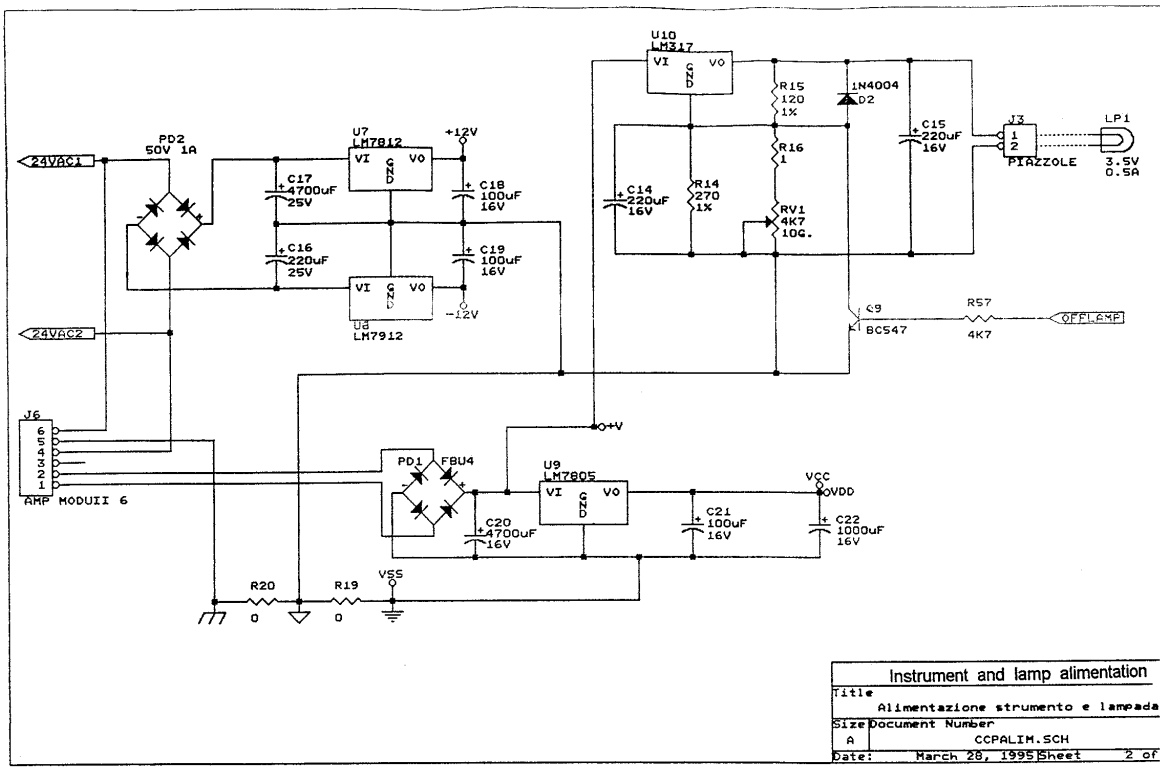
C25
0.1uF
-12V
VCC
D3
1N4148
U6B
27M9
R21
10K
D5
1N4148
J9
AMP MODUII 4
+12V
-12V
R25
470
R24
100K
1%
C23
100uF
R26
10K
1%
U6C
27M9
R22
10K
D4
1N4148
LET
R23
10K
+12V
R35
22K
Q3
BC307
R38
1K5
DZ3
10V
CONV
R37
100
1%
R36
4K7
1%
C27
0.47uF
Pol
+12V
C13
0.1uF
U6A
27M9
Analogical conversion
Title
Analogica di conversione
Size
A
Document Number
CCPANA.SCH
REV
2.1
Date:
March 28, 1995
Sheet
3 of

FIG. 6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LM317
VI
VO
GND
R15
120
1%
1N4004
D2
C15
220uF
16V
J3
1
2
PIAZZOLE
LP1
3.5V
0.5A
PD2
50V 1A
24VAC1
U7
LM7812
+12V
C17
4700uF
25V
C18
100uF
16V
C16
220uF
25V
C19
100uF
16V
U8
LM7912
-12V
C14
220uF
16V
R14
270
1%
R16
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RV1
4K7
10G.
24VAC2
Q9
BC547
R57
4K7
OFFLAMP
J6
AMP MODUII 6
PD1
FBU4
U9
LM7805
+V
VCC
VDD
C20
4700uF
16V
C21
100uF
16V
C22
1000uF
16V
R20
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R19
0
VSS
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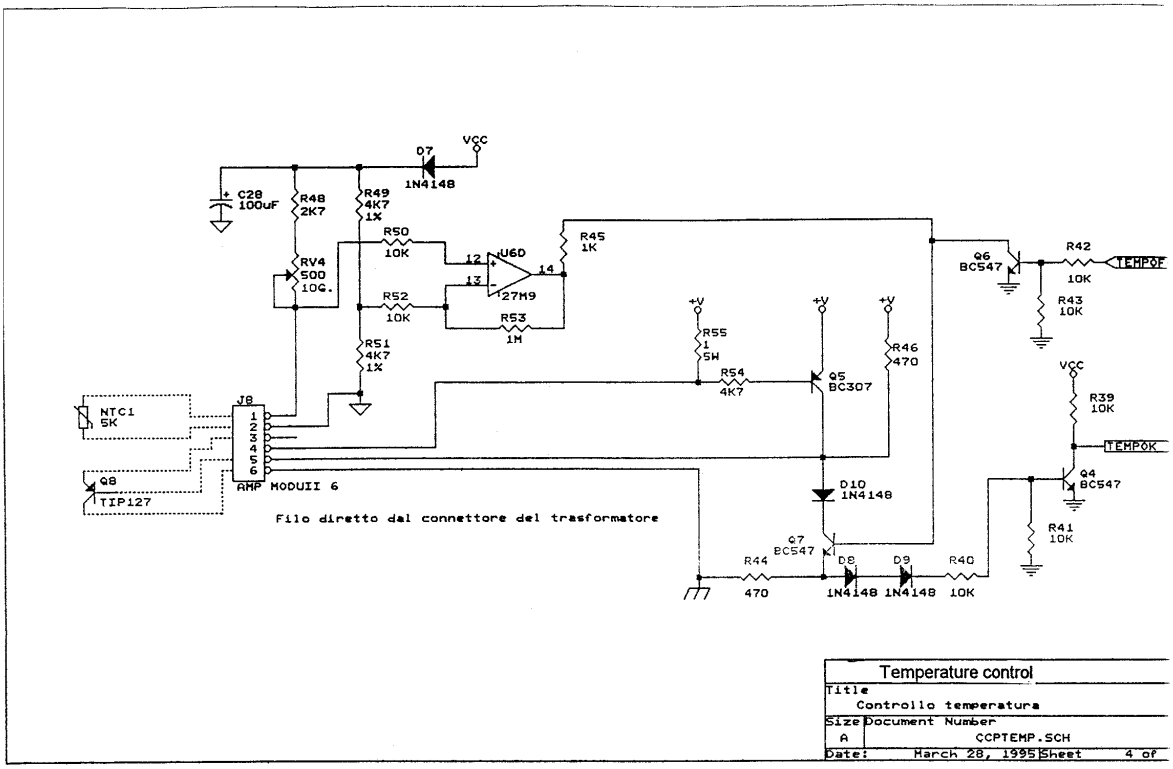
Document Number
CCPALIM.SCH
Date:
March 28, 1995
Sheet
2 of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C28
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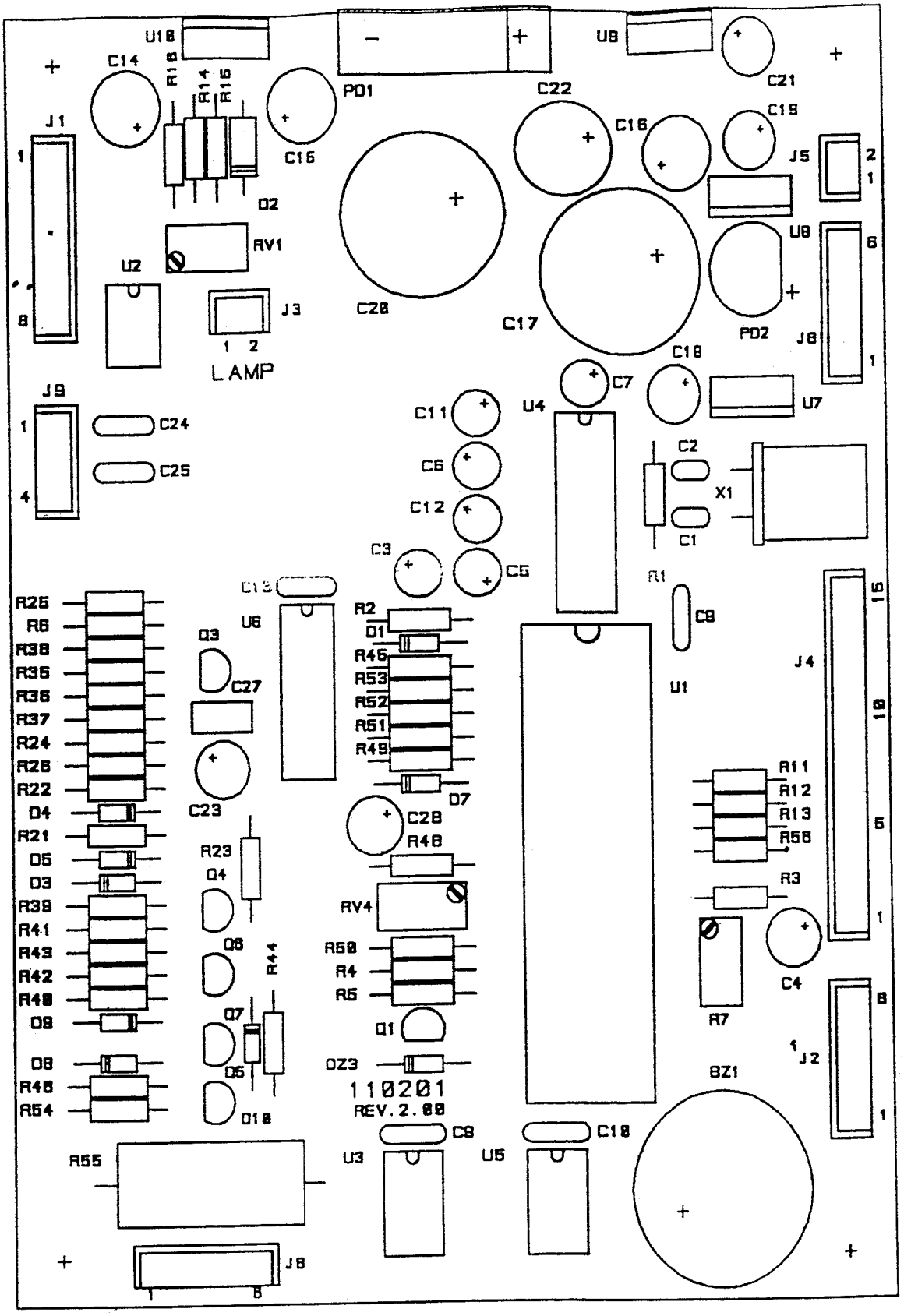
R49
4K7
1%
R50
10K
U6D
LM339
R45
1K
RV4
500
10G.
R52
10K
R53
1M
R51
4K7
1%
R55
1
5W
R54
4K7
Q5
BC307
R46
470
Q6
BC547
R42
10K
TEMPOF
R43
10K
R39
10K
TEMPOK
Q4
BC547
R41
10K
D10
1N4148
Q7
BC547
R44
470
D8
1N4148
D9
1N4148
R40
10K
NTC1
5K
Q8
TIP127
J8
AMP MODUII 6
Filo diretto dal connettore del trasformatore
Temperature control
Title
Controllo temperatura
Size
A
Document Number
CCPTEMP.SCH
Date:
March 28, 1995
Sheet
4 of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C14
R13
R14
R15
PD1
C15
J1
D2
RV1
U2
J3
1 2
LAMP
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C16
C19
J5
C17
PD2
U8
J8
C18
C7
U7
J9
C24
C25
C11
U4
C6
C12
C3
C5
C2
X1
C1
R1
C8
U1
J4
R25
R6
R38
R35
R36
R37
R24
R26
R22
D4
R21
D5
D3
R39
R41
R43
R42
R40
D9
D8
R46
R54
D13
U6
D3
C27
C23
R23
D4
D6
R44
D7
D5
D10
R2
D1
R46
R53
R52
R51
R49
D7
C28
R48
RV4
R50
R4
R5
Q1
DZ3
110201
REV.2.00
C9
U3
U5
C10
R55
J8
R11
R12
R13
R58
R3
C4
R7
J2
BZ1

FIG. 8

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und Diagnostica mbH
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Germany
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Telefax: +49 6122 9988 100

eMail: human@human.de
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